Spring 2-1-2019

BIOM 402.01: Medical Bacteriology and Mycology

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Medical Bacteriology & Mycology (BIOM 402)
Spring Semester, 2019

Instructor: Dr. Mike Minnick
Meeting: MWF 9:00 - 9:50 AM in HS 207
Office hours: Open-door policy- *please drop in whenever you like*
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Text: *Medical Microbiology* (Murray et al., 7th edition; 2013).

Performance- *606 points are possible* from **three 100-point exams**, **a 150-point final** (100 points comprehensive and 50 points from last five lectures), a **100-point term paper** and **56-point Packback participation**. *Make-up exams are available for excused and documented absences only*. Course performance will be evaluated by a classical grading system based on a curve. Ideally, this would be: A (90-100%); B (80-89%); C (70-79%); D (60-69%) and F (<60%).

Preparation- ***General Microbiology is a prerequisite for this course***. *If you have not taken General Microbiology you must obtain the instructor's approval.* Immunology is *highly recommended*, as many concepts require a basic understanding of the immune system. Reading assigned materials in advance and attending class are highly recommended, as lecture discussions, class notes and Moodle postings of lecture materials are the only sources of test questions.

Accommodations to ensure accessibility of students with disabilities will be gladly made, but to qualify you must be registered with Disability Services for Students (DSS). Arrangements for accommodations on exams must be made *in advance by the student.*

Academic misconduct will be reported and handled as described in UM's Student Conduct Code. *All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by UM. Students need to be familiar with the Student Conduct Code. The Code is available for review at:* http://www.umt.edu/student-affairs/Dean%20of%20Students/default.php. Cheating on exams will result in an automatic "F" (0 points) for that test, without exception. A second episode of cheating will result in an "F" for the course, without exception.

Dropping course or changing grading status will strictly follow UM policies and procedures, which are described in the current catalog. Students should note that they cannot change to an audit after the 15th day of instruction. In addition, dropping the course or changing grading status (to CR/NCR) are not automatically approved after the 30th day of the semester; these may be requested by petition, but the petition must be accompanied by documentation of extenuating circumstances. Requests to drop the course or change the grading status to benefit a student's grade point average will not be approved.

Cell phones and similar devices must be turned ***off*** during class. Disruption of class by ringing cell phones may result in the loss of points by the instructor.

If you face challenges securing food or housing and believe this may affect your performance in the course, please talk to me after class and/or contact the UM Food Pantry or ASUM Renter Center so we can help support you.

2019 COURSE SCHEDULE- (tentative, flexible and highly optimistic):

Date	Topic(s)	Text chapter(s)
January		
11	Introduction	1
14, 16	Virulence and pathogenesis	2, 14
18	Immune responses against pathogens	7-10
21	**Holiday- MLK Jr. Day**	
23, 25	Immune responses against pathogens	7-10
28, 30	Antimicrobials and resistance	17, 69
February		
1	Antimicrobials and resistance	17, 69
4, 6	*Staphylococcus*	18
8	*Streptococcus*	19, 20
11	**EXAM 1 (100 points)**	
13	*Streptococcus*	19, 20
15	*Enterococcus*	19, 20
18	**Holiday- President's Day** ☺	
20	Pneumococcus	19
22, 25	G+ sporeformers- *Clostridium*, *Bacillus*	21, 36
27	G+ non-sporeformers- *Listeria, Corynebacterium*	22, 23
March		
1	G+ non-sporeformers- *Listeria, Corynebacterium*	22, 23
4, 6, 8	Enterics- *Escherichia, Salmonella*	27
11	**EXAM 2 (100 points)**	
13	Enterics- *Shigella, Yersinia*	27
15	Pseudomonads	30
18	*Vibrio*	28
20	*Helicobacter*	29
22	*Campylobacter* **(Term Paper #1 due at 5 pm)**	29
25, 27, 29	**Holidays- Spring Break** ☺	
April		
1	*Haemophilus*	31
3, 5	*Mycobacterium*	25
8	*Bordetella*	32
10	*Neisseria*	26
12	*Chlamydia*	43
15	**EXAM 3 (100 points)**	
17	Spirochetes	39
19	*Mycoplasma*	40
22, 24	Pathogenic fungi	66, 67, 70-75
26	Pathogenic fungi **(Term Paper #2 due at 5 pm)**	66, 67, 70-75
30	**FINAL EXAM (150 pts)** (10:10 AM to 12:10 PM)	

Research Term Paper-

Purpose- To fulfill the 1/3 "W" (writing) credit for BIOM 402 and introduce students to current research in medical bacteriology and mycology.

Due dates- **Paper #1**- Friday, March 22 - 5:00 pm (**All students**)
Paper #2- Friday, April 26 - 5:00 pm (**Grads, undergrad re-writes**)

Assignments- *ALL students must complete Paper #1.* The assignment will be corrected and returned. *For undergrads*- IF you are satisfied with the grade you can forego a second paper. However, if you are not happy with your grade, you may do a second paper *on another article* and turn it in by the Paper #2 due date. NOTE: Paper #1 must be done to be eligible for a paper #2 submission. The better grade of the two assignments will be used to calculate your final grade. *Graduate students* must do both term papers on two separate articles and each graduate paper is worth 50 points.

Directions- Choose a *2019* research article in medical bacteriology or mycology, read it in depth and write a synopsis. The synopsis is a condensed summary of the article *in your own words*. Caution- don't write a paper on a review article or a topic of interest.

Articles- Research articles can be found in a variety of journals including *Molecular Microbiology*, *Journal of Bacteriology, Infection and Immunity*, *Journal of Infectious Diseases*, *PLoS Pathogens*, etc. Scan for articles in journals or search the PubMed database at http://www.ncbi.nlm.nih.gov/pubmed/ for topics that interest you (e.g., tuberculosis, antibiotic resistance, candidiasis, MRSA, virulence plasmids, etc.). Articles in journals subscribed to by the library can be downloaded for free on campus computers. IF you have problems downloading articles, see Mike for assistance.

Required Format-

1) *Font*- Use 11-point Arial font and 1-inch margins on all sides.

2) *Title page*- include your contact information, title of article, author(s) and full citation.

3) *Five additional full pages of text*- double-spaced and typed with a synopsis as below:

- Give a *brief* introduction of topic and goals of the research, etc. Follow this section with a discussion of the experimental approach and justification, but don't go into excessive detail on methods. Explaining **why** the authors did their experiments to address the hypothesis is more important than **how** the experiment was done.
- Do the results support the authors' hypothesis and conclusions? If you do not agree with the authors, please explain. How might the paper be improved?
- Discuss the significance of the paper to medical bacteriology / mycology. Be specific. Phrases like "..markedly improves the overall health of mankind" are vague and of little value.

4) *Reference section*- include full citations of sources used for your paper.

5) Submit your term paper via e-mail to mike.minnick@mso.umt.edu as an attached, MS Word file along with a PDF file of the corresponding research article. Hard copies will not be accepted.

Grading- 100 pts are possible, based upon writing clarity, grammar, syntax, conforming to instructions and format, overall flow of logic and how well the article is summarized. **A 10% reduction in points will be charged each day for late papers.** *Plagiarism will result in an "F" (0 pts) for the assignment- Don't steal another author's words.*

Packback participation-

Purpose- a) to help fulfill the 1/3 “W” (writing) credit for BIOM 402 and b) to practice scientific writing by formulating and exchanging questions and answers related to the course.

Packback website- https://www.packback.co/books/login. Students must enroll in Packback to participate in the forum.

Assignments- Each week, every student is expected to ask at least 2 meaningful science questions and respond to 2 questions posed by fellow students and/or the professor to receive total points for the week [4 points/week x 14 weeks/semester = 56 points/semester]. Questions and answers should stay within the broad theme of medical bacteriology and mycology. The forum will be monitored by the professor, who will also participate.

Learning outcomes for Medical Bacteriology & Mycology (BIOM 402)

[Please refer to the provided syllabus for details on BIOM 402, including its structure, content, grading and expectations.]

TOPICS	LEARNING OUTCOMES
Introduction (1 lecture)	-professor and student introductions -familiarize students with course expectations, assessment tools, grading and learning resources -discuss writing assignment (term paper) -utilize pop quiz as a springboard for discussion
Virulence factors and pathogenesis (2 lectures)	-learn essential definitions- e.g., disease, virulence, pathogenicity, LD50, ID50, etc. -Learn examples of virulence factors: • Adhesins • Factors that reduce immune efficiency • Invasive factors • Toxins • Factors that target the immune system •
Vertebrate immune responses (3 lectures)	-Learn the essentials of vertebrate immunity: • Innate immune effectors • Acquired immune effectors
Antimicrobials and resistance (3 lectures)	-become familiar with history of antimicrobials -learn 5 basic antimicrobial targets -learn the structures, functions and mechanisms of the most commonly-used antimicrobials -understand mechanisms of how bacteria become resistant to antimicrobials. -Learn the genetic basis for resistance
Staphylococcus (2 lectures)	-Learn the morphology and ecology of pathogenic staph species -understand the diseases caused by staph -learn the virulence determinants and mechanisms -understand how the pathogen is encountered, gains entry, damages host and the bacterial adaptations used to accomplish these activities. -learn the means to diagnose, prevent and treat disease caused by this pathogen
***Streptococcus*, *Enterococcus*, pneumococcus** (3 lectures)	-Learn the morphology and ecology of pathogenic streptococcal species -understand the diseases caused by strep -learn the virulence determinants and mechanisms -understand how the pathogen is encountered, gains entry, damages host and the bacterial adaptations used to accomplish these activities.

	-learn the means to diagnose, prevent and treat disease caused by streptococci
Gram + sporeformers- *Bacillus*, *Clostridium* (2 lectures)	-Learn the morphology and ecology of pathogenic Gram + sporeformers -understand the diseases caused by *Bacillus* and *Clostridium* -learn the virulence determinants and mechanisms -understand how these pathogens are encountered, gain entry, damage host and the adaptations used to accomplish these activities. -learn the means to diagnose, prevent and treat diseases caused by these pathogens
Gram + non-sporeformers- *Listeria*, *Corynebacterium* (3 lectures)	-Learn the morphology and ecology of pathogenic Gram + non-sporeformers -understand the diseases caused by *Listeria* and *Corynebacterium* -learn the virulence determinants and mechanisms -understand how these pathogens are encountered, gain entry, damage host and the adaptations used to accomplish these activities. -learn the means to diagnose, prevent and treat diseases caused by these pathogens
Enterics- *Escherichia, Salmonella, Shigella, Yersinia* (4 lectures)	-Learn the morphology and ecology of pathogenic enterics -understand the diseases caused by enterics -learn the virulence determinants and mechanisms -understand how these pathogens are encountered, gain entry, damage host and the adaptations used to accomplish these activities. -learn the means to diagnose, prevent and treat diseases caused by these pathogens
Assorted pathogens- Pseudomonads, *Vibrio*, *Helicobacter, Campylobacter, Haemophilus, Bordetella, Mycobacterium, Chlamydia, spirochetes, Neisseria, Mycoplasma* (12 lectures)	-Learn the morphology and ecology of various pathogens of clinical importance -understand the diseases caused by them -learn the virulence determinants and mechanisms -understand how these pathogens are encountered, gain entry, damage host and the adaptations used to accomplish these activities. -learn the means to diagnose, prevent and treat diseases caused by these pathogens
Human Mycoses and pathogenic fungi (3 lectures)	-Learn the morphology and ecology of pathogenic fungi -understand the diseases caused by fungi -learn the virulence determinants and mechanisms -understand how these pathogens are

	encountered, gain entry, damage host and the adaptations used to accomplish these activities. -learn the means to diagnose, prevent and treat diseases caused by these pathogens